CLAIMS

1. A diffractive security element (1) with a half-tone image (2) comprising surface portions occupied with microscopically fine surface structures (18; 19; 37) enclosed in a layer composite (10) which includes at least a transparent embossing layer (11), a protective lacquer layer (12) and a reflection layer (13) with the surface structures (18; 19; 37), which is embedded between the embossing layer (11) and the protective lacquer layer (12), wherein the surface portions with the first surface structures (18) form background fields (5) and the surface portions with the surface structure (19) which differs from the first surface structures (18) in at least one structural parameter form image element patterns (6) and the surface of the half-tone image (2) is divided into a plurality of image elements (4) which are composed of the surface portions of the image element pattern (6) and the background field (5) and which are smaller than 1 mm at least in one dimension,

characterised in that

the image element patterns (6) in the image elements (4) are of the same size, pattern strips (36) extend with a line pattern of a width (B) of 15 μm to 300 μm at least over a part of the surface of the half-tone image (2) and partially cover the background fields (5) and image element patterns (6), the line pattern is formed from surface strips (40) with pattern structures (37) and with line widths in the range of 5 μm to 50 μm, wherein the line patterns include letters, texts, line elements and pictograms and the pattern structures (37) differ from the first and second surface structures (18; 19) in at least one structural parameter [13], the line width of the surface strips (40) in the background fields (5) is constant and the surface brightness of the image elements (4) is controlled by means of the line width of the surface strips (40) on the image element pattern (6) in such a way that the surface proportion of the image element pattern (6) not covered by the line pattern is determined in accordance

with the surface brightness of the image original of the half-tone image (2) at the location of the image element (4) and having regard to the surface brightness of the adjacent image elements (4).

2. A diffractive security element (1) according to claim 1 characterised in that the first and second surface structures (18; 19) are linear diffraction gratings with spatial frequencies from the range of 150 lines/mm to 2000 lines/mm.

3. A diffractive security element (1) according to claim 1 or claim 2 characterised in that the surface structures (18; 19) are linear diffraction gratings with grating vectors (k), that in the image element patterns (6) the grating vectors (k) of the second surface structures (19) are parallel and that the grating vector (k) of the image element patterns (6) differs in azimuth (θ) from the grating vectors (k) of the first surface structures (18) in the background fields (5).

4. A diffractive security element (1) according to claim 3 characterised in that the image elements (4) whose first surface structures (18) have in the background fields (5) the same azimuth (θ) of the grating vectors (K) are arranged in accordance with their azimuth (θ) of the grating vector (k) in rows (26; 28; 29) on the half-tone image (2).

5. A diffractive security element (1) according to claim 4 characterised in that on its surface the adjacent rows (26; 28; 29) which differ in the azimuth (θ) of the grating vectors (k) are arranged in cyclically repetitive manner in the sequence ABC, ABC.

6. A diffractive security element (1) according to claim 1 characterised in that the first surface structures (18) and the second surface structure (19) are meandering diffraction gratings whose spatial frequencies are selected from the range of 150 lines/mm to 2000 lines/mm, and that the meandering diffraction gratings of the background fields (5)

and the image element patterns (6) differ at least in the azimuth range (θ) of the grating vectors (k).

7. A diffractive security element (1) according to claim 1 or claim 2 characterised in that the first surface structures (18) and the second surface structures (19) are asymmetrical diffraction gratings, wherein the grating vectors (k) of the asymmetrical diffraction gratings of the first surface structures (18) are oriented in opposite relationship to the grating vectors (k) of the second surface structures (19).

8. A diffractive security element (1) according to claim 1 characterised in that the second surface structure (19) in the surfaces of the image element patterns (6) is a diffractive scatterer selected from the group of isotropic and anisotropic matt structures, kinoforms, diffraction gratings with circular grooves at a groove spacing of 1 to 3 μm and the matt structures superimposed with a diffraction grating.

9. A diffractive security element (1) according to claim 8 characterised in that the background fields (5) as the first surface structure (18) have a structure from the group which includes flat mirrors, cross gratings with spatial frequencies of greater than 2300 lines/mm and motheye structures.

10. A diffractive security element (1) according to claim 8 characterised in that the background fields (5) as the first surface structure (18) have a linear diffraction grating with a spatial frequency from the range of 150 lines/mm to 2000 lines/mm and grating vectors (k) which are oriented in mutually parallel relationship.

11. A diffractive security element (1) according to claim 1 or claim 2 characterised in that the first surface structures (18) and the second surface structure (19) are linear or meandering diffraction gratings which differ in spatial frequency (f).

12. A diffractive security element (1) according to one of claims 1 to 11 characterised in that the spatial frequency (f) of the linear diffraction gratings in the pattern structures (37) is selected from the range of 800 lines/mm to 2000 lines/mm.

13. A diffractive security element (1) according to claim 12 characterised in that the spatial frequency (f) of the linear diffraction gratings in the pattern structures (37) is dependent on the location on the half-tone image (2).

14. A diffractive security element (1) according to claim 12 or claim 13 characterised in that the azimuthal orientation of the grating vector of the linear diffraction grating in the pattern structures (37) is dependent on the location on the half-tone image (2).

15. A diffractive security element (1) according to one of claims 1 to 7 characterised in that the pattern structure (37) is one of the diffractive scatters.

16. A diffractive security element (1) according to claim 1 characterised in that the half-tone image (2) is part of a mosaic of surface portions (44) occupied by surface structures which are independent of the half-tone image (2).

17. A diffractive security element (1) according to claim 1 characterised in that the layer composite (10) is adapted to be fixed by adhesive on a substrate (17).